

# Tracking for Physics

- **Refine the track reconstruction to make the output (more) directly usable for physics**
  - ◆ **Eliminate redundant tracks (loop branches, ghosts, ...)**
  - ◆ **Refine the fits to improve resolution and reduce tails**
    - ★ Cleanup pat. rec.
    - ★ Correct for non-Gaussian effects(hit resolution, hard scattering, ...)
  - ◆ **Recover tracks lost inside the active volume**
    - ★ Low-momentum, tracks with  $\geq 2$  layers of Svt hits
    - ★ Reduce tracking inefficiency by up to 30%
- **Push tracking ‘analysis selection’ back into reco**
  - ◆ **More information, more expertise**
  - ◆ **Consolidate and standardize tracking analysis selection**



# General Organization

## ● TrkFixupSequence

- ◆ Can be run after TrkFinalSequence
- ◆ Can be run after BetaMiniTrkSequence
  - ★ Refit mode, or 'automatic' track promotion in cache mode
  - ★ BtaCandidates must be rebuilt from reco data
    - ★ Persistent composite candidates lost
- ◆ Each TrkFixup module focuses on one effect
  - ★ IE TrkLoopFix
- ◆ Tracking quality event filter
  - ★ Flag/filter events where tracking is ambiguous
  - ★ Several levels of quality

## ● Code in TrkFixup package

## ● 'Junk' tracks on new lists

- ◆ Decay, Secondary



# TrkFixupSequence

- **TrkLoopFix**

- ◆ Remove (or combine + refit) loop branches (Gerry Lynch)

- **TrkGhostFix**

- ◆ Combine + refit ghost tracks

- **TrkAlbedoFix**

- ◆ Remove backslash tracks

- **TrkHitFix**

- ◆ Remove bad hits from fit (see Kerstin Tackman's talk)

- **TrkScatterFix**

- ◆ Accommodate hard scattering in Kalman fit (KalScatterSite)

- **TrkdEdxMomConstrain**

- ◆ Constrain P of Svt-only tracks using dE/dx (Marco Battaglia)



# TrkFixupSequence (cont)

- **TrkShortTrkFinder**

- ◆ Find tracks in  $\geq 2$  Svt layers

- **TrkBremFix**

- ◆ Combine Brem Emc cluster in Kalman fit (KalBremSite)

- **TrkMatIntFix**

- ◆ Identify material interaction tracks

- **TrkDecayFix**

- ◆ Identify decay-in-flight, split tracks as necessary

- **TrkQualityFilter**

- ◆ Filter on track reconstruction quality (using tag bits)
  - ★ TrkLoopAmbiguity
  - ★ TrkLostTrack
  - ★ ...



# Open Issues

- Should TrkFixup modules modify the ‘Default’ track list, or create a new (‘physics’) track list?
- Modify ‘Default’
  - ◆ Improvements are automatically seen by all analyses
  - ◆ Requires analyses to retune cuts
  - ◆ Changes a long-standing default
- Create a new list
  - ◆ Existing analyses are unaffected
  - ◆ New lists are needed anyways
    - ★ le looper list,
  - ◆ Can keep old (unmodified) tracks for comparison



# Status

- **Algorithm development in progress**
  - ◆ Loopers, Hit filtering,  $dE/dx$
- **TrkFixup package requested**
- **First (incomplete) version targeted for 1st week of February**
- **Volunteers welcome!**

